

SECTION 3: Vision & Strategy

Vision Statement

In 2025, we see our world and city doing things better and smarter. We live and work in “energy smart” buildings that use readily available technology to maximize energy efficiency. Computerized controls on heating, cooling, and lighting systems automatically adjust for daylight levels and turn off when rooms are vacated. Appliances and office equipment use much less energy for the tasks they perform. Geothermal heat pumps eliminate the need for furnaces and boilers in many buildings. The demand for energy conservation services has created a bustling industry with well-paying jobs. Compared to 1990, citywide energy use is down by 50%.

Cambridge also has dramatically reduced its reliance on centralized electricity systems. Buildings do not just consume electricity; they also produce power. Some have fuel cells that provide the energy reliability important to Internet businesses, biotech laboratories, and public safety operations. Solar photovoltaic panels and roof tiles are common; any excess power they produce is sold into the regional electricity grid, allowing the building owners to run their meters backwards. Solar thermal systems are installed to heat air and to produce hot water, reducing the need for fuel and electricity. Where electricity from the regional grid is still needed, users have negotiated contracts with suppliers, often through group buying programs, to buy electricity from renewable sources. Consumer demand is driving the installation of wind power turbines in the Berkshires and offshore, large-scale fuel cell facilities are running on hydrogen, and landfill gas is being recovered to generate electricity. Where renewable energy supply is insufficient, natural gas fuels clean-burning combined cycle generators.

Rooftop gardens and green roofs are routinely installed on buildings of all types to reduce the need for air conditioners in the summer and to reduce stormwater runoff to the Charles and Mystic rivers. The city’s tree canopy has expanded as a result of aggressive planting and maintenance, reducing energy needs for adjacent buildings and increasing shading to offset the urban heat island effect. There is enough quantity and variety of vegetation to support songbirds, and the shaded sidewalks and pleasant open space encourage people to enjoy the city in summer instead of fleeing the heat.

Fewer cars with single occupants are seen on the road. The regional transit system has expanded in response to demand for more and better service. Vehicles running on alternative fuels, hybrid technology, and fuel cells have replaced diesel buses. Cyclists and pedestrians dominate the street instead of automobiles, since mixed use neighborhoods mean many destinations are within walking or biking distance. With so many people on the street, crime is significantly lower; with so many fewer cars, the streets are safer for everyone.

Very little material is thrown away. Products are increasingly made out of recycled materials. Manufacturers and retailers take back old products for refurbishing or recycling.

The city provides a welcome home for diverse communities with its clean air, safe neighborhoods, and easy access to jobs, services, and recreation. Children have a sense that they are partners with adults as community stewards, and the city is safe for them to explore.

As a result of all these changes, the buildup of greenhouse gases in the atmosphere is abating and the threat of climate change is diminishing. While past emissions have caused the climate to shift, changing precipitation patterns, average temperatures, and sea level, scientists have lowered their concern about the scale of the impacts. This has happened because the previous generation recognized the problem and chose to modify their ways to protect future generations.

Strategy

Reversing climate change is a daunting task. Some scientists state that reductions in the emission of greenhouse gases of 75 to 85% are likely to be required to stabilize GHG concentrations in the atmosphere. This plan does not propose actions that would result in such deep cuts in emissions. The plan does propose actions to begin the necessary process of shifting away from our reliance on fossil fuels. As people begin to experience the multiple benefits of these actions, more ambitious steps will become more acceptable. We can draw on the examples offered by nations that have taken such steps and continue to enjoy a high quality of life. Clearly the rate at which we move away from fossil fuels will need to increase dramatically; working on actions like those proposed here is an important start.

This plan's basic strategies are ***fuel switching***, ***energy efficiency***, and ***waste reduction***. These strategies aim to reduce and replace the use of fossil fuels and reduce emissions from landfills and incinerators. The focus of these strategies is on CO₂ and to a lesser degree methane.

Fuel Switching. Fuel switching involves converting existing fossil fuel uses to alternative fuels that reduce or eliminate the emission of CO₂. Wherever possible, renewable forms of energy such as solar and wind, and landfill gases should replace fossil fuels. Fuel cells running on hydrogen should replace oil and coal fired electric generating stations. Where these technologies cannot be employed, energy systems should be switched to natural gas, which is a fossil fuel that can be used much more efficiently and cleanly than oil or coal.

In the transportation sector, alternate fuels such as natural gas, electricity, and biodiesel can replace gasoline and diesel. Affordable hybrid engines have recently arrived on the market, with their significant fuel economy benefits, and vehicles powered by fuel cells are on the horizon.

Energy Efficiency. By being smarter about how we design and use buildings and devices and by taking advantage of technological innovations, we can use less energy to accomplish our tasks. In buildings, this means taking advantage of daylight to reduce artificial light, insulating while maintaining adequate indoor ventilation, and using green building techniques. Appliances and other machines have become dramatically more energy efficient in recent decades. Choosing products with energy in mind can reduce demand, particularly for electricity.

Fuel economy is the transportation version of energy efficiency. The current federal corporate average fuel economy (CAFE) standard for new cars is 27 miles a gallon. Vehicles are on the market and on the road now that vary from 12 miles a gallon to over 50 miles a gallon. The key is consumer choice.

Drivers can purchase a 50-mile/gallon vehicle instead of a 12-mile/gallon vehicle. Another form of fuel economy is the choice of transportation mode. Greater use of public transit, carpooling, private shuttle buses, cycling, and walking would significantly reduce vehicle miles traveled (VMT). In this way, the consumption of fuel could decline.

Waste reduction. In the waste arena, strategies to create less waste and to recycle have been in place for many years. Efforts must be made to increase the return of materials to productive use by preventing waste, increasing recycling, and purchasing products with recycled content.

External Factors

Cambridge does not entirely control its fate. Our current energy, transportation, and waste systems are dependent on structures and forces outside the community. This plan proposes a role for the community to play in taking responsibility for its GHG emissions. However, the plan assumes that actions at the international, national, and state level are required and essential.

Changes in laws, standards, subsidies, and incentives at the federal and state levels can have huge impacts on local emissions; they can either undermine or enhance local actions. People from all sectors need to be active participants in the debate over issues such as increased funding for mass transit, stronger vehicle emissions standards, incentives for renewable energy research and development, regional land use planning, and improved power plant standards.

Greenhouse Gas Emissions Reduction Target

A target of reducing GHG emission rates to a level 20% below 1990 levels by the year 2010 is achievable in Cambridge. The following figures show the amount of emission reductions that may be attained to reach a 20% reduction.

Projected 2010 total GHG emissions (assumes 20% cleaner electric fuel mix)	1,837,400 tons CO ₂
12.5% electricity efficiency improvement	107,000 tons CO ₂
10% reduction in natural gas use	49,000 tons CO ₂
10% reduction in fuel oil use	2,000 tons CO ₂
Purchase 20% of electricity from green power	193,000 tons CO ₂
Increase average fuel economy to 40 MPG	103,000 tons CO ₂
Reduce vehicle miles traveled by 10%	12,000 tons CO ₂
Reduce solid waste	28,000 tons CO ₂
Total GHG Reduction in 2010	494,000 tons CO₂
Projected 2010 Total GHG with Reductions	1,343,400 tons CO₂
1990 Total GHG emissions	1,682,500 tons CO ₂
Percentage GHG reduction	20%

A cleaner electric fuel mix. The projected total of GHG emissions in 2010 assumes that the regionalelectric system will reduce emissions per kilowatt-hour by about 20%. By 2010, many new combined cycle natural gas fired power plants are expected to be on line in the Northeast, replacing most of the current oil and coal facilities. The construction of these cleaner plants is being driven by the deregulation process. It is estimated that this will reduce GHG emissions for each kilowatt-hour (kwh) of electricity generated from 1.54 pounds of CO₂ per kwh to 1.23 pounds. Whether an actual reduction in emissions materializes will depend on developments in the market beyond Cambridge's control.

Energy efficiency. The plan includes an improvement in electricity efficiency based on an assessment of demand side management prepared for Commonwealth Electric Company. That analysis indicates a market potential for a 12.5% improvement in the efficiency of electricity use. Additional efficiency improvements may become economically feasible with changes in the electricity market.

Natural gas and fuel oil use reduction. An assessment of the potential to reduce natural gas and fuel use was not available to the task force. A 10% reduction of each is a reasonable estimate, however, given the potential to improve building energy performance through measures such as upgrading of furnaces and boilers, adding insulation, and improving efficiency of water heaters and stoves.

Green power purchases. Currently, the availability of renewable energy supplies in New England is very limited. However, new requirements under electric utility deregulation legislation are expected to spur the installation of solar, wind, biomass, landfill gas, and low-impact hydropower. The Renewable Portfolio Standard requires all suppliers to include increasing amounts of green power sources in their mix of generation, and the Massachusetts Renewable Energy Trust is investing renewable energy benefits charges collected on all utility bills in green power installations. The use of "green tags," which involves purchasing the environmental attributes of electricity generated from renewable sources, is another option. In other regions of the country, local governments and businesses are committing to purchase all or a portion of their electricity from renewable sources. A goal of purchasing 20% of electricity in Cambridge from renewable sources is comparable to goals established in other municipalities.

Increasing fuel economy. The Federal government sets fuel economy standards for vehicles in an effort to improve air quality and increase the nation's energy security. The American Council for an Energy Efficient Economy states that a combined CAFE standard of 40 miles a gallon is achievable. This position is supported by a recent National Academy of Sciences report on the CAFE standard that states that a standard in the low- to mid-30 range is achievable without reducing vehicle weight.

Reduce Vehicle Miles Traveled. It is a priority of the City to reduce traffic congestion. Programs are already in place to require and encourage alternatives to single occupancy vehicle travel. A 10% reduction is consistent with the goals of the Cambridge Parking and Transportation Demand Management Ordinance.

Reduce waste. The 2000 Solid Waste Master Plan prepared by the Massachusetts Department of Environmental Protection sets a goal of reducing municipal solid waste by 60% by 2010. Currently, Cambridge has achieved a recycling rate of 33%, so the City will essentially need to double its efforts with a combination of waste reduction, composting, and recycling.

Achieving the Target

To achieve the emissions reduction target, all sectors of the community will need to take action. While the City can take a leadership role, businesses, institutions, community organizations, and individuals will have to be motivated to take part.

While this plan lays out a set of strategies and proposed actions, it is not prescriptive. It builds on past actions and proposes new actions within a framework that incorporates tracking of progress, accountability to the public, and ongoing reassessment and adjustment based on experience.

The following sections of this plan describe the role of energy, transportation, land use, and waste generation in the emission of greenhouse gases (primarily CO₂ and methane). Each section describes trends, tools, and resources to reduce emissions; actions taken since 1990 that have reduced emissions; and proposed actions to move Cambridge toward a 20% GHG reduction goal. The final section on implementation discusses the basic elements needed to ensure that effort is sustained.

Taking steps to make 20% reductions in so many activities will help us develop a systemic understanding and commitment to looking at all activities in the light of stopping climate change. It is this systemic shift that is needed for us to reach the solution that is ultimately needed-to end GHG emissions from most human activity.